

Instructor: B.L. Daku
Time: 10 minutes
Aids: Calculator

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Name:
Student Number:

1. Suppose that MATLAB is used to plot a sinusoidal signal. The following MATLAB code generates a signal $x[n]$ and plots it.

```
last=0.08;
tt=[0:T:last];
Fo=600;
xx=9*imag(exp(j*(2*pi*Fo*tt+pi/2)));
stem(xx)
```

Unfortunately, one statement was corrupted in the file, but we do know the $n = 0, 1, 2$ sample values of xx to the first four decimal places and they are

9.0000 -7.2812 2.7812

- (a) For the above code determine the correct formula for the discrete-time signal in the form:

$$x[n] = A \cos(2\pi f_0 n + \phi)$$

- (b) We also know that the discrete-time signal was due to folded aliasing. What was the original continuous-time signal in trigonometric form?
(c) What is the missing statement in the MATLAB code?

$$a) 2 \cos(\omega_0) = \frac{x[n-1] + x[n+1]}{x[n]} = \frac{9.0000 + 2.7812}{-7.2812}$$

$$\therefore \omega_0 = 143.9998 \approx 2\pi f_0 \therefore f_0 = \frac{143.9998}{2\pi} = 22.92 \text{ Hz}$$

$$x[n] = 9 \cos(2\pi(22.92)n + \phi)$$

$$b) x(t) = 9 \cos(2\pi f_0 t + \pi/2) = 9 \cos(2\pi(22.92)t + \pi/2)$$